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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/571,288	03/09/2006	Wolfgang Heeb	016906-0473	8171

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EXAMINER	
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ART UNIT	PAPER NUMBER
1793	

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Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Office Action Summary	Application No.	Applicant(s)	
	10/571,288	HEEB ET AL.	
	Examiner	Art Unit	
	Nicholas P. D'Aniello	1793	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *14 November 2008*.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-7 and 9-29* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1-7 and 9-29* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☒ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☒ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☐ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO/SB/08) Paper No(s)/Mail Date _____.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____.
5) ☐ Notice of Informal Patent Application
6) ☐ Other: _____.

DETAILED ACTION

Response to Amendments

The amendment and RCE filed November 14th 2008 is acknowledged. Claims 27-29 have been added and claim 8 has been cancelled, claims 1-7 and 9-29 remain pending in the application. All the references are of record.

Claim Objections

Claim 27 is objected to because of the following informalities: This claim contains "25 nm < d < 1000 nm" where there is no "d" in any of the claims from which it depends, this claim is taken to mean the oxide/hydroxide thickness is between 25 and 1000nm . Appropriate correction is required.

Claim Rejections - 35 USC § 102

1. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

> A person shall be entitled to a patent unless –
>
> (b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

2. Claims 1, 2, 4, 5, 6, 9, 10, 16-18, 22, 24, 25, 26 and 28 are rejected under 35 U.S.C. 102(b) as being anticipated by Werner (US Patent No. 3,844,777 of record).

As to **claim 1**, Werner teaches a brazing workpiece (taken to be a soldering workpiece as the melting temperature of the filler alloy may be as low as 424°C, see claim 1 of Werner) comprising: a solder workpiece made from aluminum (column 1 lines

8-9) and an aluminum containing brazing (soldering) filler alloy (column 1 lines 52-59) which is directly applied to the workably thin oxide film (column 2 lines 24-34).

Wherein a thickness d of the oxide layer is greater than 25nm ***when the oxide is formed*** is a product by process limitation and per MPEP 2113, "[E]ven though product-by-process claims are limited by and defined by the process, determination of patentability is based on the product itself. The patentability of a product does not depend on its method of production. If the product in the product-by-process claim is the same as or obvious from a product of the prior art, the claim is unpatentable even though the prior product was made by a different process." In re Thorpe, 777 F.2d 695, 698, 227 USPQ 964, 966 (Fed. Cir. 1985) In the instant case, the product set forth in product-by-process claim 1 (as claimed) is/are the same as that set forth by Werner, above because Werner acknowledges the presence of an oxide film on the aluminum workpiece which has and aluminum containing filler directly applied to it.

Regarding **claims 2, 16 and 17**, the thickness of the oxide layer when the oxide layer is formed does not limit the scope of this product claim as it does not positively limit the structure of the finished product.

Regarding **claims 4 and 18**, Werner discloses that the oxide layer is penetrated by the filler alloy allowing contact with the base metal therefore the oxide layer is not continuous and must comprise inhomogeneities such as cracks (column 2, lines 30-34).

Regarding **claim 5**, this claim relates to a product by process limitation, in any event, Werner discloses that the oxide layer is *chemically* treated to make it workably thin (column 2 line 28).

Regarding **claim 6**, Werner discloses cleaning with a water based solution containing HF (column 2 lines 40-42), which is reasonably considered a fluorine (halogen) containing lubricant.

In regard to **claims 9 and 19**, Werner teaches the aluminum may be 6061 which contains magnesium in the amount between 0.8 and 1.2 wt% (see TABLE).

In regard to **independent claim 10**, Werner teaches a process of joining two work pieces, at least one as described in claim 1, joining the work pieces by a brazing process, due to the low melting temperature of the brazing filler alloy of the brazing method this is reasonably considered a soldering process.

Regarding **independent claim 22**, Werner discloses a brazing (soldering) process for joining at least two work pieces to one another comprising:

a. providing a soldering workpiece made from aluminum and/or aluminum compounds (column 1 lines 8-9),

b. increasing a thickness of an oxide layer naturally occurs at the elevated temperature and humidity of industrial environments,

c. the surfaces are prepared by introducing inhomogeneities into the oxide surface by a chemical cleaning process (column 2, lines 20-34), and

d. The parts are then soldered together in a vacuum atmosphere and allowed to cool in an inert atmosphere. (column 2, lines 35-61).

The process of Werner is reasonably considered a soldering process in view of applicant's definition of soldering (page 4, last paragraph of instant specification) which defines standard soldering for aluminum as a joining process with

temperatures between 500 and 660ºC; where the soldering alloys (referred to as braze alloys in Werner) have a melting temperature between 424 and 615 ºC (see claim 1 of Werner) the process of Werner is consequently considered a soldering process. The cleaning process of Werner creates inhomogeneities in the oxide layer which allows for a capillary effect (drawn in due to the surface tension of cracks and holes) of the soldering alloy into the oxide film (column 1, lines 19-25).

In regard to **claim 24**, although Werner does not specifically teach the oxide film detaching from the workpiece, however the workpiece and process of Werner are structurally and methodically indistinguishable from the claimed method and therefore it is reasonably assumed that at least part of the oxide film will fragment and detach from the workpiece during the soldering step.

In regard to **claim 25**, Werner teaches the surfaces are chemically cleaned with a solution of water and hydrofluoric acid (a halogen containing lubricant) to provide a workably thin oxide layer which the filler alloy may penetrate (column 2 lines 39-42) the oxide layer is penetrated by the filler alloy allowing contact with the base metal therefore the oxide layer is not continuous and must comprise inhomogeneities such as cracks.

Regarding **independent claim 26**, Werner discloses the soldering workpiece of claim 1 which is aluminum with an aluminum oxide layer to which a filler is directly applied where the oxide is a sufficient thickness to provide contact between the brazing (soldering) compound and the workpiece underneath the oxide by allowing penetration

of the filler alloy (column 2 lines 30-34), therefore the oxide film is not continuous and must have inhomogeneities such as cracks.

Regarding **claim 28**, Werner discloses that the oxide layer is penetrated by the filler alloy allowing contact with the base metal therefore the oxide layer is not continuous and must comprise inhomogeneities such as cracks (column 2, lines 30-34).

Claim Rejections - 35 USC § 103

3. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

4. Claim 3 is rejected under 35 U.S.C. 103(a) as being unpatentable over Werner as applied to claim 1 above, and further in view of McMillan et al. (US Patent No. 3,986,897, of record).

Werner teaches a soldering work piece with solder directly applied to an oxide layer as applied to claim 1 above. **Claim 3** differs from the reference in calling for the oxide/hydroxide layer to be predominantly boehmite. However, it would have been obvious to one of ordinary skill in the art at the time of the invention to provide the aluminum oxide layer in a hydrated boehmite form because McMillan et al. discloses the treatment of aluminum by converting aluminum oxide to boehmite in order to achieve an aluminum substrate with a smoother less hillocked surface which also avoids pitting,

electro-migration and has improved thermal properties (column 1, lines 43-50 and column 2, lines 52-62).

5. Claims 7, 11, 12, 13, 15 and 20 are rejected under 35 U.S.C. 103(a) as being unpatentable over Werner as applied to claim 1 or 10 above, and further in view of Swaney (US Patent No. 3,747,199, of record).

Werner teaches a soldering work piece with an oxide layer thicker then the native oxide layer as applied to claim 1. **Claim 7** differs from the reference in calling for a particular lubricant. However, it would have been obvious in the art to provide the soldering work piece with a lubricant containing sulfur because Swaney teaches a method of brazing (soldering) aluminum articles which have been provided with a petroleum based lubricant, Cindol 3401, which contains bromine (halogen) and sulfur compounds which provides for successful brazing of the components (column 2, lines 23-27).

In regard to **claims 11, 12 and 20**, Swaney teaches a method of successfully vacuum brazing aluminum articles as applied above where the workpiece has been cold worked by a pressing (punching) operation (column 1, lines 36-48). It would have been obvious to one of ordinary skill in the art at the time of the invention to machine the workpiece to the desired dimensions and use a halogen and sulfur compound containing lubricant in the method of Werner to successfully form a brazed article as taught by Swaney.

In regard to **claim 13**, it would have been obvious in the art that the thermal degreasing and soldering would be carried out together because Swaney teaches a single heating operation where the lubricants are volatilized (evaporated, thermal degreasing) and then the temperature is increased to effectuate the braze (column 2, lines 28-47).

In regard to **claim 15**, Swaney teaches an example of his invention is for the fabrication of a typical aluminum brazed heat exchanger (column 1, lines 36-44).

6. Claims 14 and 21 are rejected under 35 U.S.C. 103(a) as being unpatentable over Werner as applied to claim 10 above, and further in view of Knepper et al. (USP 5,618,357)

In regard to **claims 14 and 21**, Werner discloses the aluminum joining method of claim 10 where the heating is carried out in a vacuum (column 2 line 50). Claims 14 and 21 differ from the reference in calling for the heating to be carried out in an inert gas atmosphere such as argon. However, Knepper et al. teaches the joining of aluminum components by a soldering process which can take place in an inert/protective gas atmosphere or in a vacuum (column 1 lines 35-40) where an inert/protective gas such as argon is used (column 3, lines 34-37).

It would have been obvious to one of ordinary skill in the art at the time of the invention to employ a shielding gas such as argon in the process of Werner because inert (shielding) gasses and vacuum processing are art recognized alternatives for aluminum joining as exemplified by Knepper et al.

7. Claims 23, 27 and 29 are rejected under 35 U.S.C. 103(a) as being unpatentable over Werner (US Patent No. 3,844,777) as applied to claim 22 above, and further in view of Orecchia (USP 3,666,869).

Werner teaches the aluminum soldering method or workpiece as applied above where a *thin oxide film* is formed on the surface of a workpiece. **Claims 23, 27 and 29** differ from the reference in calling for the aluminum oxide layer to be 25 nm to 1000nm where the reference is silent regarding the thickness. However, it would have been obvious to one of ordinary skill in the art at the time of the invention to have the oxide thickness be at least 25 nm because Orecchia teaches that aluminum components form *thin oxide films* **up to** four tenths a millimeter (400,000 nm) in thickness when exposed to air and elevated temperatures (column 2, lines 40-55) and such a thickness naturally passivates the surface of the workpiece. "Up to" this relatively large thickness is taken to encompass the claimed range and the optimum value would be discovered through routine skill in the art (see MPEP 2144.05 - Obviousness of Ranges).

Response to Arguments

Applicant's arguments have been fully considered but they are not persuasive or moot. Specifically, the arguments against Mori are moot because the reference is no longer relied upon.

The amendment to claim 1 has rendered the thickness of the oxide a product by process limitation which does not limit the scope of the final product. Werner discloses that aluminum naturally forms a tenacious oxide (column 2 lines 21-23) and therefore the increasing the thickness of the oxide layer is taken to be inherent in the method of Werner as aluminum naturally forms an oxide layer in any ambient atmosphere. The chemical cleaning process introduces inhomogeneities such that the filler alloy contacts the base metal during the subsequent bonding process (column 2 lines 30-34).

The Orecchia reference is used to show that the aluminum oxide layers can naturally grow greater 25nm (column 2 lines 50-54) and therefore the thickness limitations are also embraced by Werner.

Inquiries

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Nicholas P. D'Aniello whose telephone number is (571)270-3635. The examiner can normally be reached on Monday through Thursday from 8am to 5pm (EST).

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Jessica Ward can be reached on (571) 272-1223. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

/N. P. D./
Examiner, Art Unit 1793

/Kiley Stoner/
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